of aortic (Ao) coarctation (CoA) may aid in the selection and placement of balloons and/or stems. Three-dimensional (3-D) echo with image acquisition by intravascular ultrasound (IVUS) should precisely define the anatomy. We performed an in-vitro study to evaluate the accuracy of 3-D IVUS in measuring the extent narrowing of CoA.

Methods: Explanted dog (7) and pig (3) Aos were studied. CoAs of various length, shape, and narrowing were created by external bands, molded over time. 2-D IVUS images were acquired every 0.3 mm by motorized withdrawal of the IVUS catheter, and subsequently stored for volume rendering (TomTec). From optimal 3-D images longitudinal, maximal (max), and minimal (min) diameter (D) measurements of CoA were obtained pre (10), post (10), and at the most narrowed site (10), which were compared with anatomy.

Results: High quality 3-D reconstructions of CoA were rendered in all specimens, with detailed visualization of the shape, position and extent narrowing. Max Ds of pre, post and most narrowed sites were 10.6 ± 3.7 mm (4–20) by 3-DE; and 10.0 ± 4.0 mm (4–21) by anatomy, (p = NS; Y = 0.92X + 0.58, r = 0.98, SEE = 0.03). The min D's were 8.9 ± 3.2 mm (4–17) by 3-DE; and 8.8 ± 3.3 mm (3–17) by anatomy, (p = NS; Y = 0.92X + 0.84, r = 0.95, SEE = 0.06). The length of narrowing was 21.5 ± 9.8 mm (8–34) by 3-DE; and 21.1 ± 9.7 mm (8–34) by anatomy, (p = NS; Y = 1.0X + 1.4, r = 0.99, SEE = 0.02).

Conclusion: From this in-vitro model 3-D IVUS accurately renders a true depiction of aortic coarctation with precise measurements of the length, shape and internal diameter of the proximal, most narrowed and distal segments. This 3-D imaging will provide additional information for successful interventional catheterization.

1095-155 Three Dimensional ECHO Right Ventricular Volumes in Children With Congenital Heart Disease Validated by MRI

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Measurement of right ventricular (RV) volume and function by two-dimensional echo is unreliable due to its asymmetric shape. The purpose of this study was to validate the accuracy of Transthoracic 3D ECHO assessment RV volumes in children after CHD surgery by comparison to MRI measured volumes.

Methods: 14 children aged 1.4 to 12.9 (median 6.5) years, weighing 10.1 to 25.7 (median 18.6) kg were studied after repair of tetralogy of Fallot (11 pts), hypoplastic left heart (2 pts), or atrial septal defect (1 pt). MRI imaging used a GE 1.5 Tesla scanner with images gated for respiration and ECG. Volumes were reconstructed from 5 mm thickness, contiguous slices from tricuspid annulus to the site of the pulmonary valve. Internal borders were manually traced and volumetric slices summated. 3D ECHO was done with a prototype, transthoracic 5 MHz omniplane transducer (Hewlett Packard). Sector scans were obtained at each 5 or 10 degrees of rotation. Data sets were processed on a TomTec workstation and 3 mm voxel slices were planimetered and summated. Volumes were obtained in systole (RVESV) and diastole (RVEDV).

Results: Linear regression analysis demonstrated R^2 value of 0.89 for RVEDV, 0.91 for RVESV and 0.63 for ejection fraction. The coefficients with standard error for RVEDV were 0.65 ± 0.07, for RVESV 0.65 ± 0.06 and for EF 0.78 ± 0.18.

Conclusions: 3D ECHO RV measurements of end-systolic, end-diastolic volumes and ejection fraction correlate closely with MRI in children with operated congenital heart disease. Transthoracic 3D ECHO may allow accurate, serial, quantitative evaluation of the RV in these patients.

1095-156 Mitral Valve E Point Sepal Separation: A Quantitative Indicator of Left Ventricular Function in Children With Abnormal Septal Motion

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Background: Currently, ejection fraction (EF) is the only quantitative method of among left ventricular function (LVF) in children with abnormal septal wall motion; however, an EF is not always able to be obtained. The mitral valve E Point Septal Separation (EPSS) is a single plane, easily obtained, quantitative echocardiographic index of LVF. EPSS has been shown to have an inverse relationship with LVF in adult post myocardial infarction patients who have paradoxical (PDX) or flattened (FLT) interventricular septal wall motion (IVS).

The purpose of this study was to evaluate the validity of EPSS as a predictor of LVF in children with PDX or FLT IVS, such as occurs with dilated cardiomyopathies (DCM), congenital heart disease (CHD) pre and post surgery (SX), and others.

Methods: We reviewed echocardiograms of patients with FLT or PDX IVS motion, that had adequate M-Mode short axis mitral valve tracings for EPSS and 2D images for calculation of EF by Simpson's biplane method. Qualitative LVF was reviewed and defined as: 1 = normal or 2 = fair/poor. Linear and logistic recession analysis were used to assess whether EPSS predicted EF and qualitative LVF, respectively. Other covariants considered included left ventricular end diastolic dimension (LVED), body surface area, weigh, sex, and age.

Results: We included 30 children (ages 0–19 years) with PDX and FLT IVS (8 DCM, 17 CHD, pre and post SX, 5 others). EPSS was a reliable predictor of EF with a correlation coefficient = −0.845, p value < 0.0001. For every 1 mm increase in EPSS the EF decreased by 2.3%. EPSS was also a good predictor of qualitative LVF (p < 0.0001). LVED was not an independent predictor of EPSS when function was considered.

Conclusion: EPSS is a reliable, alternative tool for assessing left ventricular function in children with multiple causes of paradoxical and flattened interventricular septal motion. The ease of measurement and requirement of only one of the parasternal views make this method rapid and practical.

1095-157 Characterization of Vascular Ring Anomalies – A Comparative Evaluation of Echocardiography and Magnetic Resonance Imaging

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Background: Diagnosis of vascular ring (VR) anomalies has been reported by both echocardiography (ECHO) and magnetic resonance imaging (MRI), but comparative studies have been limited.

Methods: We evaluated VR abnormalities in 12 pts (ages 2 mo–15 yr, m = 2 yr) with both ECHO and MRI. Seven pts had double aortic arches (DAA). In 2 of the pts with DAA, one arch segment was atretic. Five pts had right aortic arches (RAA) with retroesophageal left subclavian arteries. Color Doppler and 2D imaging was performed in all pts studied with ECHO. Cardiac gated spin echo and multiphasic gradient echo evaluations with subsequent 3D reconstruction were performed in all pts examined with MRI. Imaging modalities were evaluated for 1) identification of RAA 2) identification of left aortic arch (LAA) 3) delineation of aortic arch diameter and patency (AADP) 4) delineation of origin and course of carotid arteries (CA) 5) delineation of origin and course of subclavian arteries (SA) 6) identification of Kommerell's diverticulum of the descending aorta (KA) 7) Sidedness (to left or right of spine) of thoracic descending aorta (ISA).

Results

	RAA	LAA	AADP	CA	SA	KA	ISA
ECHO	12/12	4/7	14/19	16/24	10/24	0/5	4/12
MRI	12/12	7/7	19/19	24/24	24/24	5/5	12/12

ECHO was effective in identifying the presence of a RAA. In the presence of a RAA, ECHO was not uniformly successful in identifying a concomitant LAA. ECHO likewise had a poor success rate in delineating retroesophageal subclavian arteries, the presence of a Kommerell's diverticulum of the descending aorta, and intrathoracic sidedness of the descending aorta.

Conclusion: ECHO can successfully screen for the presence of a RAA, but has limited effectiveness for defining the detailed anatomical features of VR.

1095-158 Special Capabilities of Micro-Multiplane Transesophageal Echocardiography for Studying Congenital Heart Disease Surgery in Neonates, Infants and Children

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Little information of the use and importance of multiplane transesophageal echocardiography (TEE) in infants with congenital heart disease has been available. We report our initial experience with clinical utility of the recently developed, "NIH" 7.5 MHz, 64 element, 8 mm micro-multiplane TEE probe designed for the youngest patients with congenital heart disease. A total of 19 patients (age: 5 days–36 years; weight: 2.8–80.4 kg) have been studied consecutively during open-heart surgery. There were no TEE related complications in this study. For all 19 patients, detailed information about anatomy and blood flows characterizing their pre- or postoperative conditions were obtained using 0°–180° rotational imaging. Especially for complicated lesions, such as single ventricle and anomalous pulmonary venous return, probe rotation allowed complete segmental delineation of connections between vessels and chambers, pulmonary venous pathways, Fontan baffles and branch pulmonary arteries. Superior resolution of septal patches, valve architecture and coronary artery origins and flow after arterial switch proce-